

What is claimed is:

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2 *[C]* 1. An automated sales promotion selection system comprising:
3 *CI* an input device that receives customer data relating to purchases of
4 items by customers;
5 a computer system including a central processing unit and a storage
6 unit including a purchase advisor neural network and a plurality of item
7 identifiers that identify items available for purchase, wherein the purchase
8 advisor neural network responds to customer data received from the input
9 device by determining if one or more of the item identifiers stored in the
10 storage unit corresponds to an item likely to be purchased by one of the
11 customers and identifies a sales promotion relating to the item, and wherein
12 the central processing unit selectively adapts the response of the purchase
13 advisor neural network in response to customer data; and
14 an output device that receives the item identifiers of the likely
purchases determined by the purchase advisor neural network.

1 2. The automated sales promotion selection system of claim 1, wherein the
2 customer data received by the customer information device includes data relating to a
3 purchase of one or more items that occurred during a current customer visit to a
4 purchase location, and wherein the identified sales promotion comprises a list of items
5 to be suggested for purchase during the current customer visit.

1 3. The automated sales promotion selection system of claim 1, wherein the
2 central processing unit assigns the items purchased by the customer during the present
3 customer visit into predetermined purchase classes comprising items frequently
4 purchased together, wherein the purchase advisor neural network determines an item
5 likely to be purchased by receiving the purchase class assignments from the central
6 processing unit and identifying as likely to be purchased those items that are members
7 of a purchase class observed to be in a purchase by the customer but are missing from
8 the items purchased, and wherein the identified sales promotion comprises a listing of
9 at least one of the items determined to be missing from one of the purchase classes to
10 be suggested to the customer for purchase during the current customer visit.

1 4. The automated sales promotion selection system of claim 3, wherein the
2 central processing unit selectively adapts the response of the purchase advisor neural
3 network by updating at least one predetermined purchase class based upon purchase
4 data from previous customer transactions.

1 5. The automated sales promotion selection system of claim 1, wherein the
2 storage unit further includes a customer demographics neural network that estimates
3 buying characteristics of one or more customers most likely to be at a purchase
4 location, and also produces item identifiers comprising the estimated item purchases
5 of the estimated customers.

1 6. The automated sales promotion selection system of claim 5, wherein the
2 central processing unit receives the item identifiers of the estimated purchases from
3 the customer demographics neural network, segments the item identifiers into
4 purchase classes, and provides the purchase advisor neural network with the
5 segmented item identifiers as input; and wherein the purchase advisor neural network
6 responds to the input by determining if one or more of the item identifiers corresponds
7 to an item likely to be purchased by one of the estimated customers.

1 7. The automated sales promotion selection system of claim 1, wherein the
2 storage unit further includes a neural network training subsystem that collects a set of
3 sales purchase data generated by customer purchases, selects a training epoch subset
4 of the collected sales purchase data, and performs a neural network training process
5 with the selected data, and wherein the neural network training subsystem further
6 repeatedly collects data, selects a training subset, and performs the training process
7 until all neural network training epoch data subsets in the collected sales purchase
8 data have been processed.

1 8. The automated sales promotion selection system of claim 1, wherein the
2 central processing unit selectively adapts the response of the purchase advisor neural
3 network by retraining the purchase advisor neural network with purchase data from
4 previous customer transactions.

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9. An apparatus comprising:

- a storage unit;
- a central processing unit configured to receive customer data relating to a current customer; and
- a purchase advisor neural network stored in the storage unit and configured to respond to the customer data received by the central processing unit and identify a sales promotion for the current customer, wherein the response of the purchase advisor neural network is selectively adaptable by the central processing unit in response to customer data.

10. The apparatus of claim 9, further comprising a plurality of item identifiers stored in the storage unit, the item identifiers identifying items available for purchase, wherein the customer data includes data relating to purchases of items by the customer, and wherein the purchase advisor neural network is configured identify the sales promotion by determining if one or more of the item identifiers stored in the storage unit corresponds to an item likely to be purchased by the customer.

11. The apparatus of claim 10, wherein the customer data includes data relating to a purchase of one or more items that occurred during a current customer visit to a purchase location, wherein the identified sales promotion comprises a list of items to be suggested for purchase during the current customer visit, wherein the central processing unit assigns the items purchased by the customer during the present customer visit into predetermined purchase classes comprising items frequently purchased together, wherein the purchase advisor neural network determines an item likely to be purchased by receiving the purchase class assignments from the central processing unit and identifying as likely to be purchased those items that are members of a purchase class observed to be in a purchase by the customer but are missing from the items purchased, and wherein the identified sales promotion comprises a listing of at least one of the items determined to be missing from one of the purchase classes to be suggested to the customer for purchase during the current customer visit.

12. The apparatus of claim 11, wherein the central processing unit selectively adapts the response of the purchase advisor neural network by updating at least one

3 predetermined purchase class based upon purchase data from previous customer
4 transactions.

1 13. The apparatus of claim 10, wherein the storage unit further includes a
2 customer demographics neural network that estimates buying characteristics of one or
3 more customers most likely to be at a purchase location, and also produces item
4 identifiers comprising the estimated item purchases of the estimated customers.

1 14. The apparatus of claim 13, wherein the central processing unit receives the
2 item identifiers of the estimated purchases from the customer demographics neural
3 network, segments the item identifiers into purchase classes, and provides the
4 purchase advisor neural network with the segmented item identifiers as input; and
5 wherein the purchase advisor neural network responds to the input by determining if
6 one or more of the item identifiers corresponds to an item likely to be purchased by
7 one of the estimated customers.

1 15. The apparatus of claim 10, wherein the storage unit further includes a
2 neural network training subsystem that collects a set of sales purchase data generated
3 by customer purchases, selects a training epoch subset of the collected sales purchase
4 data, and performs a neural network training process with the selected data, and
5 wherein the neural network training subsystem further repeatedly collects data, selects
6 a training subset, and performs the training process until all neural network training
7 epoch data subsets in the collected sales purchase data have been processed.

1 16. The apparatus of claim 9, wherein the central processing unit selectively
2 adapts the response of the purchase advisor neural network by retraining the purchase
3 advisor neural network with purchase data from previous customer transactions.

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17. A method of dynamically identifying sales opportunities for purchases of
 2 items
 3 by customers from an inventory of items, the method comprising:
 4 training a purchase advisor neural network that generates an output set
 5 of item identifiers comprising sales opportunities for purchases of the items;
 6 providing the trained purchase advisor neural network with customer
 7 data;
 8 generating a sales opportunity output with the trained purchase advisor
 9 neural network in response to the customer data, the output including one or
 10 more item identifiers that identify items in the inventory;
 11 selecting a set of item identifiers from among the sales opportunity
 12 output generated by the purchase advisor neural network as potential
 13 purchases from the inventory of items; and
 14 selectively adapting the response of the purchase advisor neural
 15 network in response to customer data.

18. The method of claim 17, wherein providing customer data comprises
 2 providing the purchase advisor neural network with data that relates to a purchase of
 3 one or more items by a customer that occurred during a present visit by the customer
 4 to a purchase location.

19. The method of claim 17, wherein selecting item identifiers of potential
 2 purchases for the customer comprises:
 3 estimating buying characteristics of one or more customers most likely
 4 to be at a purchase location, and
 5 estimating item identifiers of items most likely to be purchased by the
 6 estimated customers.

20. The method of claim 17, wherein training the purchase advisor neural
 2 network comprises:
 3 collecting a set of sales purchase data for a plurality of customers;
 4 selecting a training epoch subset of the collected sales purchase data;

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23. A method of dynamically identifying a sales opportunity for a customer,
the method comprising:

receiving customer data relating to a current customer;
generating with a purchase advisor neural network a sales opportunity
output for the current customer in response to the customer data; and
selectively adapting the response of the purchase advisor neural
network in response to customer data from previous customer transactions.

24. The method of claim 23, wherein the customer data includes data relating
to a selection of one or more items by a customer that occurred during a present visit
by the customer to a purchase location, and wherein the sales opportunity output
includes one or more item identifiers that identify additional items in the inventory.

25. The method of claim 23, wherein selectively adapting the response of the
purchase advisor neural network includes retraining the purchase advisor neural
network with purchase data from previous customer transactions.

26. The method of claim 23, further comprising:
providing a demographics neural network with prediction data
comprising the current date, current time of day, and environmental
information; and
generating with the demographics neural network an output set of data
defining predicted purchases of customers during a purchasing transaction
based upon the prediction data.

27. An automated sales promotion selection system comprising:

- an input device that receives prediction data;
- a computer system including a central processing unit and a storage unit including a customer demographics neural network that responds to the prediction data by estimating the buying characteristics of a customer likely to be at a purchase location, the central processing unit configured to identify a sales promotion based upon the estimated buying characteristics; and
- an output device that receives the sales promotion.

28. The automated sales promotion selection system of claim 27, wherein the computer system further includes:

a plurality of item identifiers stored in the storage unit that identify items available for purchase; and

a purchase advisor neural network stored in the storage unit that responds to the estimated buying characteristics by determining if one or more of the item identifiers stored in the storage unit corresponds to an item likely to be purchased by the customer likely to be at the purchase location and identifies a sales promotion relating to the item.

29. The automated sales promotion system of claim 28, wherein the customer demographics neural network generates item identifiers of estimated purchases; wherein the central processing unit receives the item identifiers of the estimated purchases from the customer demographics neural network, segments the item identifiers into purchase classes, and provides the purchase advisor neural network with the segmented item identifiers as input; and wherein the purchase advisor neural network responds to the input by determining if one or more of the item identifiers corresponds to an item likely to be purchased by one of the estimated customers.

30. The automated sales promotion selection system of claim 27, wherein the prediction data is selected from the group consisting of current date, current time of day, environmental information, and combinations thereof.

31. An apparatus comprising:

a storage unit;

a central processing unit configured to receive prediction data; and

a customer demographics neural network that responds to the

prediction data received by the central processing unit by estimating the

buying characteristics of a customer likely to be at a purchase location,

wherein the central processing unit is configured to identify a sales promotion

based upon the estimated buying characteristics.

32. The apparatus of claim 31, further comprising:

a plurality of item identifiers stored in the storage unit, the item

identifiers identifying items available for purchase; and

a purchase advisor neural network stored in the storage unit and

configured to respond to the estimated buying characteristics by determining if

one or more of the item identifiers stored in the storage unit corresponds to an

item likely to be purchased by the customer likely to be at the purchase

location and to identify a sales promotion relating to the item.

33. The apparatus of claim 32, wherein the customer demographics neural

network is configured to generate item identifiers of estimated purchases; wherein the

central processing unit is configured to receive the item identifiers of the estimated

purchases from the customer demographics neural network, segment the item

identifiers into purchase classes, and provide the purchase advisor neural network

with the segmented item identifiers as input; and wherein the purchase advisor neural

network is configured to respond to the input by determining if one or more of the

item identifiers corresponds to an item likely to be purchased by one of the estimated

customers.

34. The apparatus of claim 31, wherein the prediction data is selected from

the group consisting of current date, current time of day, environmental information,

and combinations thereof.

